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COMPLETE SPECIFICATION.

Improvements in a method and apparatus for Packaging
a Pad of Superposed Cellulosic Tissues.

ERRATUM

SPECIFICATION No. 627,218

In the heading on Page 11, for "August 12, 1949" read "August 3, 1949"

THE PATENT OFFICE,
12th January, 1950

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and apparatus for packaging a pad which
comprises a plurality of superposed, simi-
20 larly arranged thin, creped, cellulosic tissues,
compressed in a direction perpendicular to
the creping of the tissues and being capable
of being expanded in the opposite direction
to provide a low density absorptive product.
25 The compression reduces the length of the
pad, without substantial change in the
thickness or width thereof, and increases
the unit density of the pad within the range
of 2 to 20 times. The individual tissues may
30 be of plain cellulosic material or they may
contain asphalt or other materials.

As will hereinafter appear, the present
invention is concerned particularly with pads
made of plain tissue, this product being
35 widely used in hospitals for surgical and
related purposes. For this use, the com-
pressed pad has very great advantages : it
can be readily handled, stored, and trans-
ported while in the compressed state, and
40 it can be re-expanded to the normal, low
density, high absorptive state by simply
stretching the pad. These characteristics
of the product are of great value in normal
times, and are of particular value in time of
45 war.

However, certain difficulties have arisen
in the provision of satisfactory packaging for

above stated requirements.

The invention consists in a method of
packaging a multi-ply, previously com-
pressed and expanded, creped, cellulosic pad
characterized by the steps of recompressing
the pad in a lengthwise direction while main-
70 taining the width and thickness of the pad
substantially uniform, restraining the recom-
pressed pad against longitudinal expansion
or buckling while a sleeve member having
longitudinal and peripheral dimensions sub-
75 stantially equal to the equivalent dimensions
of the recompressed pad is placed about said
recompressed pad and then applying a close
fitting, outer covering including a sleeve
portion to the combination of said pad and
80 sleeve so that said outer covering extends
at right angles to said first mentioned sleeve.

The invention also consists in an apparatus
for carrying into effect the method of the
preceding paragraph, such apparatus having
85 a pair of complementary jaw members each
of which includes a flat main portion and
upstanding side portions, means supporting
said jaw members at one end thereof whereby
said members are cantilevered relative to
90 said support means ; said support means
including a hinged support for one of said
complementary jaw members whereby that
jaw member may be moved toward and



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COMPLETE SPECIFICATION.

Improvements in a method and apparatus for Packaging a Pad of Superposed Cellulosic Tissues.

I, ARTHUR FREDERICK BURGESS, a British Subject of the firm of Lloyd Wise & Co., of 10 New Court, Lincoln's Inn, London, W.C.2, Chartered Patent Agents, do hereby declare the nature of this invention, (a communication from abroad from INTERNATIONAL CELLU-COTTON PRODUCTS COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, 919 North Michigan Avenue, City of Chicago, County of Cook, State of Illinois, United States of America), and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :—

The present invention relates to a method and apparatus for packaging a pad which comprises a plurality of superposed, similarly arranged thin, creped, cellulosic tissues, compressed in a direction perpendicular to the creping of the tissues and being capable of being expanded in the opposite direction to provide a low density absorptive product. The compression reduces the length of the pad, without substantial change in the thickness or width thereof, and increases the unit density of the pad within the range of 2 to 20 times. The individual tissues may be of plain cellulosic material or they may contain asphalt or other materials.

As will hereinafter appear, the present invention is concerned particularly with pads made of plain tissue, this product being widely used in hospitals for surgical and related purposes. For this use, the compressed pad has very great advantages : it can be readily handled, stored, and transported while in the compressed state, and it can be re-expanded to the normal, low density, high absorptive state by simply stretching the pad. These characteristics of the product are of great value in normal times, and are of particular value in time of war.

However, certain difficulties have arisen in the provision of satisfactory packaging for

the compressed pad. Since the material is used mainly for surgical purposes the package must be air tight and capable of being made sterile. To save weight, shipping and storage space the package should be light and should occupy a minimum of space. At the same time the package must be quite strong mechanically, in order to hold the pad in the compressed state, and to facilitate handling and storage the package must remain flat until opened for use. The packaging procedures heretofore known to the art have not provided a package capable of meeting the above requirements, and the principal object of the present invention is to provide an improved method and apparatus for packaging which shall fully satisfy all of the above stated requirements.

The invention consists in a method of packaging a multi-ply, previously compressed and expanded, creped, cellulosic pad characterized by the steps of recompressing the pad in a lengthwise direction while maintaining the width and thickness of the pad substantially uniform, restraining the recompressed pad against longitudinal expansion or buckling while a sleeve member having longitudinal and peripheral dimensions substantially equal to the equivalent dimensions of the recompressed pad is placed about said recompressed pad and then applying a close fitting, outer covering including a sleeve portion to the combination of said pad and sleeve so that said outer covering extends at right angles to said first mentioned sleeve.

The invention also consists in an apparatus for carrying into effect the method of the preceding paragraph, such apparatus having a pair of complementary jaw members each of which includes a flat main portion and upstanding side portions, means supporting said jaw members at one end thereof whereby said members are cantilevered relative to said support means ; said support means including a hinged support for one of said complementary jaw members whereby that jaw member may be moved toward and

away from the other jaw member, the space between said jaw members being substantially rectangular in cross section and said jaw members being provided with cut-away portions whereby a pad disposed therein may be grasped and removed from said jaw members without opening those members.

Referring now to the accompanying drawings:—

Figure 1 is a plan view of an apparatus embodying the present invention;

Figure 2 is a sectional view on the line 2—2 of Figure 1;

Figures 3, 4, 5 and 6 are enlarged, fragmentary, sectional views on the lines 3—3, 4—4, 5—5, and 6—6, respectively, of Figure 1;

Figure 7 is a perspective view of a pad compressed and ready for packaging according to the present invention;

Figure 8 is a perspective view illustrating the pad of Figure 7 within an inner sleeve of the packaging of the present invention;

Figure 9 is a perspective view, partially in cut away section, showing the compressed pad in place in the completed packaging; and

Figures 10 and 11 are perspective views partially in cut away section of a modified or alternative packaging.

A compressed pad of the general type to which the present invention relates is illustrated at 11 in Figure 7. The pad 11 comprises a plurality of superposed sheets 13, as illustrated in the enlarged portion of Figure 7; the creping in all or substantially all of the sheets extends in the same direction, and the individual sheets 13 have a basis weight (i.e. weight of flat uncreped sheets) within the range of from 4 to 9 pounds for 480 sheets, 24×36 inches. In the products used for hospital or surgical purposes, the sheets 13 normally contain in excess of 95% of pure cellulosic fibre. The sheets 13 are manufactured on the Yankee type machine and as manufactured they have a crepe ratio (i.e. the ratio of the length of the uncreped sheet to the length of the creped sheet) of 2 or 3 to 1.

In making the compressed pad 11, a proper number of the sheets 13 are superposed one on top of the other with the creping in all or substantially all of the sheets running transversely to the length of the pad. The pad is then in a known manner longitudinally compressed, preferably without substantial change in its thickness or width, to reduce its length and simultaneously to increase the unit density thereof within the range of from 2 to 20 times.

As previously pointed out, the product used for hospital or surgical purposes must be packaged in such manner that a completely air tight, sterile package will be provided, and the package must be capable

of holding the pad flat and in the desired compressed state. The obtaining of a package capable of satisfying these requirements is complicated, because of the tendency of the compressed product to re-expand following the compressing operation. This necessitates the use of a strong restraining means for holding the pad in the package, while at the same time, to save space, it is necessary that the package shall not add materially to the bulk of the pad.

The apparatus by which the packaging of the pad is effected is illustrated as a whole in Figure 1, and detailed illustrations are contained in Figures 2 to 6.

Pads 11 which have previously been compressed as already mentioned, and which have been cut to proper size, are delivered to a work table indicated generally at 17, in Figure 1. Because of the stresses set up within the compressed product during the compressing operation, there is substantial re-expansion of the cut pads 11 before they reach the work table 17. As a result re-compression is necessary, in order to restore the pad to the desired density and dimensions for packaging.

The re-compressor includes a converging nozzle or chute 19 which is rectangular in cross section and through which the pad 11 is propelled by means of two flexible belts 21, which of themselves form two of the sides of the nozzle. The top and bottom of the nozzle or chute 19 may comprise flat, polished, metal plates 23 and 25, and to facilitate entry of the pad 11 therebetween, the upper plate 23 may be cut away and bevelled as illustrated at 27.

The belts 21 may be of any suitable composition material, and should have a width substantially equal to the separation of the top and bottom plates 23 and 25. The belts are supported upon suitable pulleys 29 and are driven at equal linear speed by any suitable means, not shown. It is desirable that backing supports be provided for the belts 21 as illustrated at 31. Considerable stress is required to compress the pads 11 as they pass through the chute 19, and in the absence of these backing supports 31 excessive belt tension may be required.

The re-compressor chute 19 discharges into a pad holding structure which comprises a pair of opposed, flat surfaced, jaw members 33 and 35 made of sheet metal and provided with V-shaped slots 37 for facilitating the grasping and handling of the pad after the inner sleeve is applied thereto. The details of the jaw members 33 and 35 are shown particularly in Figures 2 and 3. The lower jaw 35 is fixedly supported, at its inner end only, upon the table 17 with its upper surface co-planar with the upper surface of the bottom plate 25 of the chute 19.

The outer edges of the lower jaw are turned up as illustrated at 39 in Figure 3, the amount of the turned up portion 39 being approximately equal to the desired final width of the pad. The upper jaw 33 is of a complementary shape having downwardly depending side portions 41 which extend over the upstanding side portions 39 of the lower jaw 35 as illustrated particularly in Figure 3.

The upper jaw 33 is hingedly supported for rotatable movement toward and away from the lower jaw 35 by means of a shaft 43, which is supported on the work table 17 by suitable bearing supports 45, and is biased in the direction of the lower jaw 35 by adjustable tension springs 47. Both jaws are thus provided with a cantilever type support which, as will hereinafter appear, is of importance.

The mechanism for applying the outer sleeve to the pad 11 includes a flat support plate 49 which is supported on the work table 17 by a guide member 51 and frame members 52. The upper surface of the plate 49 is co-planar with the upper surface of the lower unit 55 of a second pair of jaw members 53 and 55. The jaw members 53 and 55 are likewise formed of sheet metal and are provided with cut-away, generally V-shaped, slots 57 for facilitating the handling and grasping of the pad 11 during the packaging operation. The lower jaw member 55 is fixedly supported at its inner end only, on the work table 17 and has upstanding side portions 59. The upper jaw member 53 has depending side portions 61 which extend along and cooperate with the corresponding side portions 59 of the lower jaw member 55. The upper jaw member 53 is hingedly supported on the work table 17 so as to be movable toward and away from the lower jaw member 53 by a shaft 63 and suitable bearings 65. If desired, adjustable tension springs 67, similar to the springs 47, may be provided for biasing the upper jaw 53 in the direction of the lower jaw 55.

As previously stated, the pads 11 to be re-compressed are received at the work table 17 in a somewhat expanded state. One of these pads 11 is placed on the left hand table portion 68 of the lower plate 25, and is pushed into the space between the upper and lower plates 23 and 25 of the recompressor chute 19. The belts 21 which move in the directions indicated by the arrows in Figure 1, carry the pad 11 through the recompressor chute 19 and propel it into the space between the two jaws 33 and 35. This movement of the pad 11 through the converging chute 19 automatically effects re-compression of the pad, and since the re-compressed pad is immediately moved into the space between the jaw members 33 and 35 re-expansion thereof is prevented by the jaw members.

Prior to the recompressing operation, an inner sleeve 69 is slipped over the jaws 33 and 35 as illustrated in Figures 1, 2 and 3. This inner sleeve 69, which in the form shown is a flat rectangularly shaped tube, should have a length approximately equal to the final length of the pad 11 and a perimetrical dimension which is likewise approximately equal to the corresponding dimension of the pad 11. The inside dimension of the jaws are likewise approximately equal to the dimensions desired in the final product. The movability of the upper jaw 33 is relative to the lower jaw 35, and the cantilever support means for the jaws permits the sleeve 69 to be readily slipped thereover.

The operation of the recompressor forces the recompressed pad 11 between the two jaw members about which is disposed the inner sleeve 69, as above stated. With the pad 11 in this position, it is possible for the operator to grasp both the pad 11 and the sleeve 69 in the areas exposed by the slots 37 in the jaw members and to withdraw both the sleeve and the pad simultaneously from the jaws. If necessary, the jaws may be slightly compressed in order to facilitate this movement.

The inner sleeve 69 will now be positioned about the pad 11 with its longitudinal axis extending substantially parallel to the lines of creping in the constituent sheets making up the pad 11, as illustrated in Figure 8. The inner sleeve 69 which is joined along the edges 71, has sufficient strength to restrain the pad from longitudinal expansion, but this arrangement will not prevent buckling in all instances, and it does not provide an air and dust-tight package which is desired.

The pad 11, with the inner sleeve 69 in place thereon, is next placed upon the platform plate 49 against the guide 51 and is slid in the direction of its width into position between the jaws 53 and 55, as illustrated particularly in Figures 1, 5 and 6. It will be noted that the lines of creping in the pad 11 and the closed sides of the inner sleeve 69 extend crosswise of the second pair of jaws, a change of position of 90° as compared with the position of the pad in the first pair of jaws, while the pad 11 and the inner sleeve 69 are held in position between the second pair of jaws 53 and 55. The second sleeve 73, which is shown as a flat rectangularly shaped bag made of heavy Kraft paper, or other suitable sheet material is slid over the jaws as illustrated in Figures 1 and 6. The longitudinal axis of the outer sleeve 73 thus extends at right angles to the longitudinal axis of the inner sleeve 69 and to the lines of creping in the tissues in the pad. When the bottom of this outer sleeve 73 reaches the end of the pad 11 and the inner sleeve 69, the entire combination may be removed as a unit by simply pulling it away from the

jaws 53 and 55, the cut-away V-shaped slots 57 which are provided in the jaws and the cantilever type support for the jaws facilitating this operation. The ends 75 of the outer sleeve 73 may then be folded over and sealed in the usual manner as illustrated in Figure 9. The dimensions of the outer sleeve 73 is only sufficiently greater than the corresponding dimensions of the combination of the pad 11 and the inner sleeve 69 to snugly fit such combination.

The above described package constitutes a most satisfactory container for products of the described type. Apparently because of the provision of the inner sleeve 69 and the outer sleeve 73, and the location of those sleeves with the maximum strength portions thereof extending at right angles to each other, the normal tendency of the compressed pad 11 to expand and to buckle is completely prevented. At the same time, when it is desired to use the product, the inner sleeve 69 can be easily severed so as to permit convenient withdrawal of any desired amount of the compressed product from the outer sleeve without having to remove the entire pad from the package. This, of course, is very advantageous in maintaining the high standards of cleanliness which are essential in surgical work.

The packaging procedure as described is rapid. It requires a minimum of machinery, and hence, in addition to providing a highly efficient and very satisfactory package, it may be practiced at very low cost.

As an alternative, the inner sleeve may comprise a bag 77 of paper, fabric, or other suitable sheet material, and for certain purposes such a bag possesses particular advantages. A package which includes this type of inner sleeve is shown in Figures 10 and 11, and it will be noted that the bag 77 is of substantially the same shape and dimensions as the compressed, multi-ply pad 11 which is contained therein. The sides of the bag 77 are closed, so as to form a retaining sleeve which is generally similar to the inner sleeve 69, by overlapping edges 79 adhesively attached together. One of the ends of the bag 77 is closed by a folded-over flap 81 which is glued or otherwise attached in place as illustrated. The other end of the bag 77 is left open, as illustrated in Figure 11. It is desirable that the depth of the bag 77 should be equal to or slightly less than the width of the pad 11 when measured in a direction lengthwise of the creping in the constituent sheets.

The bag 77 is applied to the pad 11 in substantially the same manner as the inner sleeve 69 in the previously described procedure, that is, the bag 77 is slipped over the cantilevered jaws 33 and 35 located at the discharge end of the recompressor unit, prior to the recompressing operation and the

recompressed pad 11 is discharged directly into the bag 77 at the conclusion of the recompressing operation. The longitudinal axis of the bag 75 extends parallel to the lines of creping in the sheets which make up the pad 11. The bag 77 with the pad 11 in place therein may then be removed from the jaws 33 and 35 by grasping both the pad and the bag in the area of the cut-out slots 37 and pulling both units out of the open end of the jaws.

Following this operation, an outer sleeve 83 which may be generally similar to the sleeve 73 is applied to the combination of the pad 11 and the bag 77 in substantially the same manner as in the previously described embodiment. The resultant package effectively retains the pad 11 in the compressed state without buckling. At the same time it is air-tight, and the contents can be rendered surgically sterile by conventional sterilization procedures. Also of importance the actual package occupies very little bulk and does not materially increase the weight of the product. Similarly to the previously described package, the retention of the compressed pad 11 against expansion and without tendency to buckling appears to result from the provision of the two sleeves (provided by the inner open ended bag 79 and the outer sealed bag 83), which are so positioned that the longitudinal axes thereof extend at right angles to each other.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Method of packaging a multi-ply, previously compressed and expanded, creped, cellulosic pad characterized by the steps of recompressing the pad in a lengthwise direction while maintaining the width and thickness of the pad substantially uniform, restraining the recompressed pad against longitudinal expansion or buckling while a sleeve member having longitudinal and peripheral dimensions substantially equal to the equivalent dimensions of the recompressed pad is placed about said recompressed pad and then applying a close fitting, outer covering including a sleeve portion to the combination of said pad and sleeve so that said outer covering extends at right angles to said first mentioned sleeve.

2. Method in accordance with Claim 1 wherein the outer covering is sealed after being positioned upon the inner sleeve.

3. Apparatus for carrying out the method of Claim 1 or 2, having a pair of complementary jaw members each of which includes a flat main portion and upstanding side portions, means supporting said jaw members at one end thereof whereby said members are cantilevered relative to said support means; said support means in-

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cluding a hinged support for one of said complementary jaw members whereby that jaw member may be moved toward and away from the other jaw member, the space between said jaw members being substantially rectangular in cross section and said jaw members being provided with cut-away portions whereby a pad disposed therein may be grasped and removed from said jaw members without opening those members.

4. Apparatus according to Claim 3 having a pair of flat, spaced, substantially parallel, plate members defining the upper and lower surfaces of a compressor chute, and a pair of belt members supported between said plate members defining the side walls of said chute and being arranged in angular relation to each other so as to cause the side walls of said chute to converge, support means being provided which include a rigid backing member for each of said belts, and

means for driving the operative reaches of both of said belts in the same direction whereby the multi-ply creped cellulosic tissues will be carried through said chute by said belts and simultaneously be compressed.

5. Method of packaging a multi-ply, previously compressed and expanded, creped, cellulosic pad substantially as hereinbefore described.

6. Packaging apparatus substantially as hereinbefore described with reference to Figures 1—6 of the accompanying drawings.

Dated this 23rd day of April, 1946.

For the Applicant :

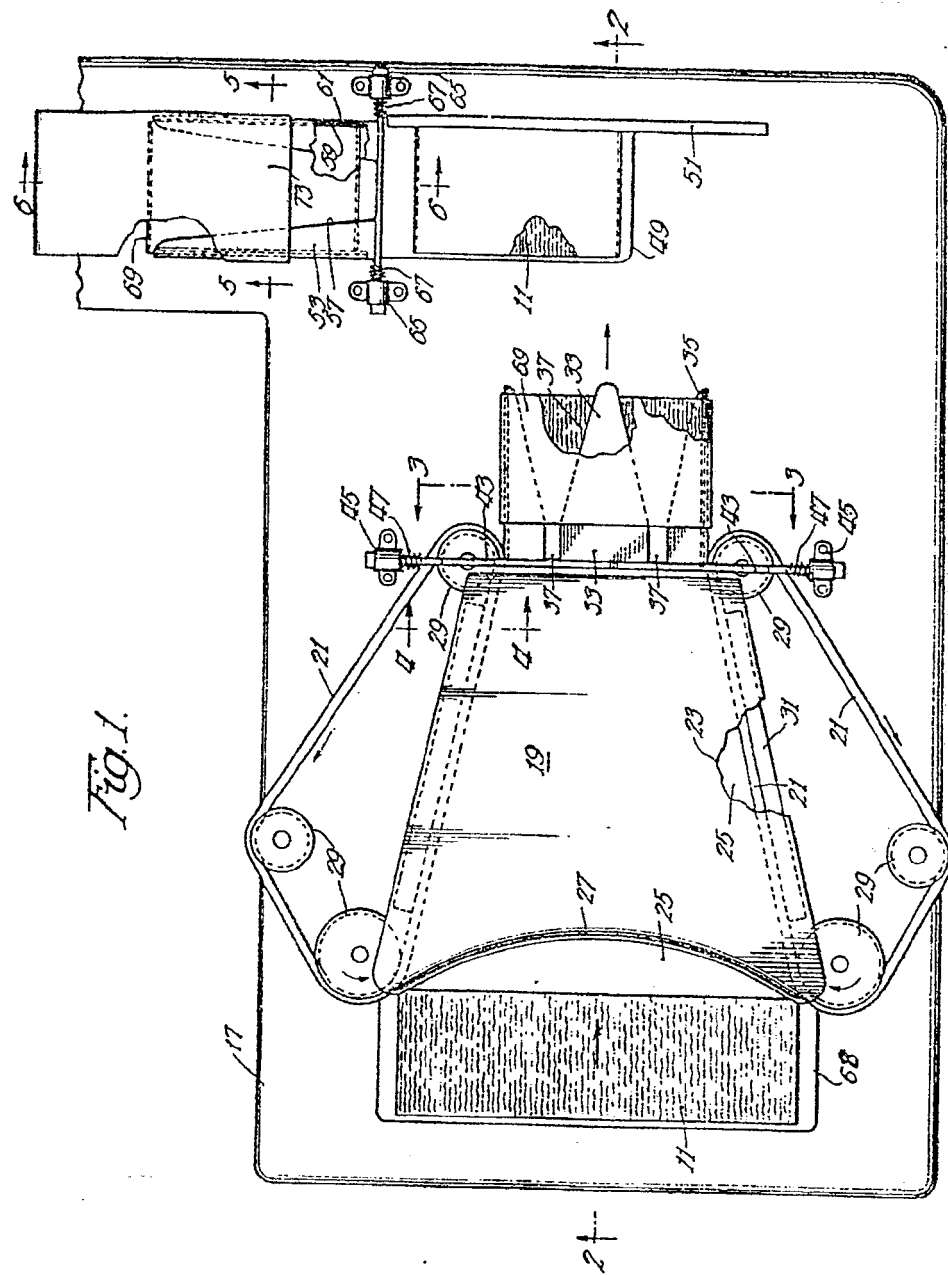
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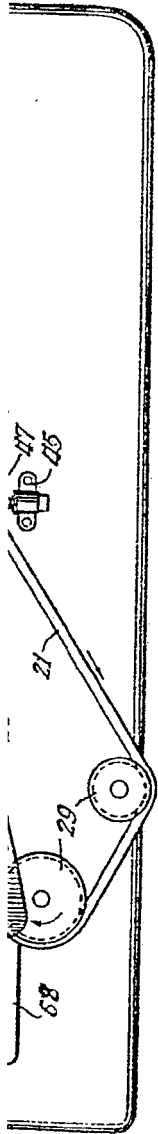


Fig. 2

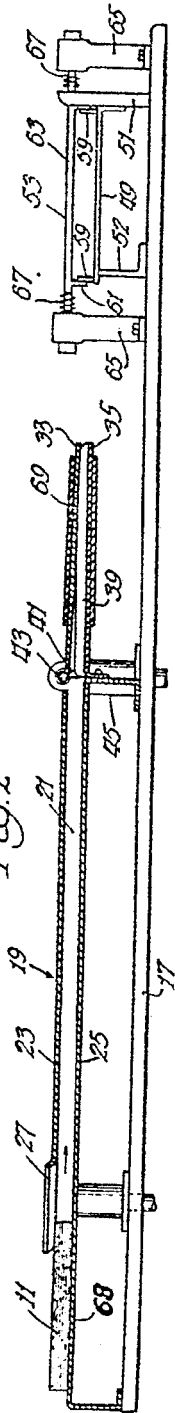


Fig. 3

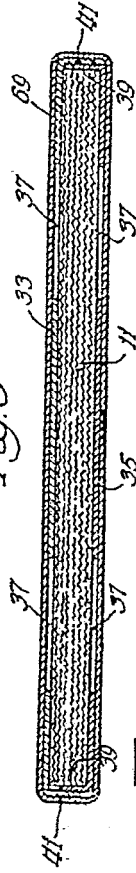


Fig. 4

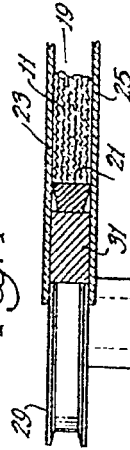


Fig. 5

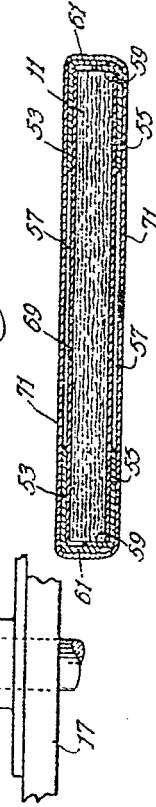
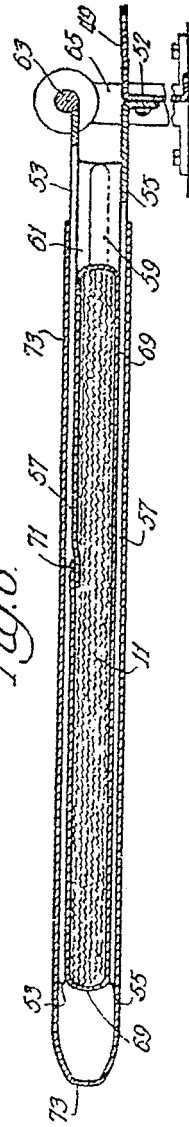


Fig. 6



[This Drawing is a reproduction of the Original on a reduced scale.]

